Public Land and Resources Law Review

Volume 27

# Ground Water Management in Montana: On the Road from Beleaguered Law to Science-Based Policy

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# Ground Water Management in Montana: On the Road from Beleaguered Law to Science-Based Policy

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This article draws heavily on "Ground Water in Montana: Management in Search of Science and Reason," published in The Water Report, Sept. 15, 2005. The authors thank The Water Report for permission to use portions of that article herein. Those cited portions of The Water Report are included without quotation marks to make it easier for the reader.

## I. INTRODUCTION

> "Facts do not cease to exist just because they are ignored."
> (Aldous Huxley)

The twin forces of deep, extended drought and rapidly expanding population have created an unprecedented demand for water in Montana. While conflict over water helped shape the history of this semi-arid, high-desert state, recent events have caused the spotlight to shine even brighter on the issue of water scarcity. Dry riverbeds, empty reservoirs, fish kills, and irri-

gators watching their crops wither in the field have become facts of life in Montana.

These forces have combined to push the demand for new ground water in Montana at a pace that has left lawmakers, agency staff, water-right holders, and conservationists struggling to make sense out of the existing scheme for regulating ground water in Montana.

This article first chronicles Montana's recent ground water history, highlighting a key water management issue with which most western states are grappling–the link between ground water and surface water. It then explains Montana's efforts to allow new ground water development without depleting stream and river flows. The article concludes with recommendations for statutory reform of ground water management. If implemented, such reforms would place Montana at the forefront of a scientifically sound water management policy that safeguards our water resources into the future.[1]

## II. GROUND WATER PUMPING'S IMPACTS ON RIVER FLOWS

Irrigators have been among those hardest hit by Montana's successive drought years. It is no surprise that they have taken a lead in informing water managers and legislators that ground water and surface water are linked. Although hydrologists have documented the connectivity between ground and surface water for decades,[2] it is the testimonials from people like John McGuire that are bringing new relevance to well-known scientific principles.

John McGuire, owner of the McGuire Ranch in Montana's Smith River basin, "flood irrigates land about four miles southwest of the small town of White Sulphur Springs in the same way it has been done for the past 120 years."[3] His family moved to the Smith River basin in 1945. He and other old-timers say they have never seen the river this dry before, even during the dust-bowl drought of the 1930's.[4]

About five years ago he first noticed that when a new irrigation well located upstream of his fields was running, the South Fork of the Smith

1. *See* Robert Glennon, *Water Scarcity, Marketing, and Privatization,* 83 Tex. L. Rev. 1873, 1900 nn. 108-109 (2005) (noting ground water reforms in Arizona and the western states that apply the prior appropriation doctrine to ground water). While states like Colorado have tightly managed ground water, Colorado's management does not protect river flows, but only ensures that the immediate needs of the next downstream appropriator are met.

2. Charles V. Theis, *The source of Water Derived from Wells: Essential Factors Controlling the Response of an Aquifer toDevelopment,* 10 Civil Engineering No. 5 277, 277-280 (1940); Charles V. Theis, *The Effect of a Well on the Flow of a Nearby Stream,* 22 Eos Trans. American Geophysical Union 734-738 (1941).

3. Eve Byron, *Water and the Smith,* Helena Indep. Rec. (Aug. 10, 2003); http://www.helenair.com/articles/2003/08/10/top/a01081003_01.txt.

4. Eloise Kendy, John Wilson & Laura Ziemer, *Ground Water in Montana: Management in Search of Science and Reason,* 19 The Water Report 14 (Sept. 15, 2005) [hereinafter *Ground Water in Montana*].

River– McGuire's irrigation source—was "close to killed."[5] The new ground water well was located within a quarter-mile of the South Fork. McGuire wrote to the Meagher County Conservation District in 2002 that, "at first we put this down to the dry year, but when the wells were shut down at the close of irrigating season, the creek began to run again about three weeks later, leading us to believe that the wells were affecting the stream flow."[6]

The connection between ground water and surface water in alluvial aquifers is a basic hydrologic principle. It can be found in virtually any hydrogeology textbook and has been known and documented for decades. Hydrologists recognize ground water and surface water as "simply two manifestations of a single integrated resource."[7] Any increase in the consumption of one reduces the availability of the other:

> Because the groundwater is tributary to the stream, there will then be 'one cup of water less in the stream for each cup of water taken out of the aquifer'. Thus, all groundwater extractions from an aquifer tributary to a stream capture waters that would otherwise enter the stream. Streamflow then is reduced by the total amount of water withdrawn from the tributary aquifer [minus return flow]. This capture is a reduction in discharge from the aquifer to the stream.[8]

A May 2002 memo by a staff hydrologist at the Montana Department of Natural Resources and Conservation (DNRC) cites no fewer than 25 studies that document the connection between ground and surface water.[9]

## III. RAPIDLY-EXPANDING POPULATIONS CREATE DEMAND FOR GROUND WATER

Gallatin County has become the fastest-growing county in Montana. Just north of Yellowstone National Park, with the town of Bozeman, Montana State University, two ski areas in the County's Gallatin and Bridger mountain ranges, and a small, busy airport, the influx of new people has become

5. Byron, *supra* n. 3.

6. *Id.*

7. Robert M. Hirsch, in forward to Thomas C. Winter, Judson W. Harvey, O. Lehn Franke & William M. Alley, *Groundwater and Surface Water: A Single Resource* 1139 U.S. Geological Survey Circular III (USGS 2002) [hereinafter *Groundwater and Surface Water*].

8. Herman Bouwer and Thomas Maddock III, *Making Sense of the Interactions Between Groundwater and Streamflow: Lessons for Water Masters and Adjudicators*, 6 Rivers 19, 27 (1997).

9. Bill Uthman, *Groundwater-Surface Water Interactions, Groundwater Development, Montana Water Law, and Water Rights Permitting*, Report to the DNRC Water Resources Division (May 31, 2002).

a constant. The population of Gallatin County increased from 21,902[10] in 1950, to 67,831 in 2000,[11] with almost all of the population increase occurring within the Gallatin Valley. Land use in the valley is undergoing a major change: irrigated acreage is decreasing, making way for residential and commercial development. From 1964 to 2002, farmland in Gallatin County decreased from about 410,000 to 290,000 hectares (from 1,000,000 to 700,000 acres).[12]

This rapid population growth means that the aquifer that feeds the Gallatin River is being tapped for ground water at an unprecedented rate. Except for the city of Bozeman (pop. 28,000), all 68,000 county residents rely on ground water for domestic supplies, primarily through individual wells.[13] Just in the last 20 years, the number of permitted ground water appropriations has nearly tripled.[14]

Over-tapping the aquifer can have a devastating effect on the flows in the Gallatin River. According to Dave Pruitt, long-time chief water commissioner for the Gallatin River, the wells have already impacted the Gallatin River.[15] Increased ground water withdrawals coupled with prolonged drought have caused the Gallatin to reach its lowest base flow in recorded history in December of 2003. On the Gallatin River, "'recorded history' dates back 114 years and includes the droughts of the 1930's, which gives context to the significance of these figures."[16]

Certainly Gallatin County is not unique. Professor Robert Glennon has documented rivers and streams across the United States that have suffered from dewatering due to new ground water pumping for irrigation, municipal and commercial uses.[17] States from Arizona to Maine and from Wisconsin to Texas, all have stories to tell about ground water pumping's impacts on rivers.[18]

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10. Geospatial and Statistical Data Center University of Virginia Library http://fisher.lib.virginia.edu/collections/stats/histcensus/index.html; *select* 1950, *highlight* total population, *select* Submit Query, *check* Montana, *select* Retrieve County-Level Data (February 13, 2006).

11. Montana Department of Commerce, *Montana County Decennial Census Resident Population: 1990 and 2000*, http://ceic.commerce.state.mt.us/C2000/PL2000/ctypop9000.xls (March 21, 2001).

12. Bureau of the Census, *Census of Agriculture: Statistics for the State and Counties, Montana* vol. 1, pt. 38 (1964); Bureau of the Census, *Census of Agriculture: State and County Data* vol. 1, pt. 26, Table 1 (2002), http://www.nass.usda.gov/census/census02/volume1/mt/CenV1MT1.txt (last accessed May 1, 2006).

13. M.R. Cannon and Dave R. Johnson, *Estimated Water Use in Montana in 2000*, U.S. Geological Survey Scientific Investigations Report 2004-5223, 27, http://pubs.usgs.gov/sir/2004/5223/pdf/ sir2004_5223.pdf (last updated Sept. 16, 2005).

14. Gallatin County now has 11,076 permitted ground water appropriations. In 1986, the number was just 3,779. Montana Department of Natural Resources and Conservation, *DNRC Water-Right Query System*, http://nris.state.mt.us/dnrc/waterrights/default.aspx (last accessed May 1, 2006).

15. Dave Pruitt, personal communication to Laura Ziemer (March 1, 2005).

16. S. R. Kinsella, *Conserving the West's Groundwater Resources*, 46 Trout: The Journal of Coldwater Fisheries Conservation 19, 23 (Summer 2004).

17. Robert Glennon, *Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters* 3 (Island Press 2002) (noting that ground water pumping has depleted natural freshwater supplies and may exhaust aquifers).

18. *Id.* at 8; 89-93; 133; 202-203.

## IV. THE MONTANA WATER CODE'S CURRENT TREATMENT OF GROUND WATER

Montana is a conjunctive water management state and, at least on paper, considers ground water and surface water a unitary resource. Other than the requirement that new ground water wells pumping more than 35 gallons per minute (gpm) obtain permits[19] and limited provision for the designation of certain controlled ground water areas,[20] the State does not actively manage ground water.

The doctrine of prior appropriation governs both ground and surface water applicants, who must show "no injury" to senior water users in order to obtain a permit for a new appropriation.[21] However, in practice, the check on new ground water withdrawals is only invoked when senior water rights holders – surface water users – object to new permits.[22] The seniors then face the formidable expense of retaining legal counsel and obtaining expert hydrologic analyses to demonstrate "injury" from the proposed new ground water withdrawals.

As a result, surface water users have turned to Montana's basin closures to limit their injury from ground water withdrawals. In the late 1980's and early 1990's, the Montana Legislature acknowledged the over-appropriation of many of its rivers by enacting a series of basin-closure laws that place a moratorium (with some specific exceptions) on the processing or granting of new water appropriation requests in specific regions of the state.[23] The moratoriums are in place until the final decrees of water claims are completed, which is likely to be decades from now. Though the state has pursued the quantification of water right claims through a statewide adjudication since 1982, the task is far from complete, and to date, has progressed at a glacial pace.[24]

The idea behind a basin closure is straightforward: don't compound an already serious problem with additional water demands until Montana quantifies its existing claims and knows whether any water is even avail-

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19. Mont. Code Ann. § 85-2-306(3)(a) (2005) et seq.

20. *Id.* at §§ 85-2-506 to 509.

21. *Id.* at § 85-2-311(1)(b).

22. *See e.g. Montana Trout Unlimited, et al. v. Mont. Dept. of Nat. Res. and Consv.*, 2004 Mont. Dist. LEXIS 1950 ( Oct. 8, 2004) (discussing ground water permit applications with documented adverse effects to senior water users that Department was prepared to issue in the absence of objections).

23. *See* Mont. Code Ann. § 85-2-321 (Milk River Basin); § 85-2-330 (Teton River Basin); §§ 85-2-336 to 337 (Upper Clark Fork River Basin); § 85-2-344 (Bitterroot River Basin); §§ 85-2-342 to 343 (Upper Missouri River Basin).

24. Because the adjudication effort had already passed the 20-year mark with only a handful of final decrees, the 2005 Montana Legislature passed House Bill 22 to add staff and resources to the adjudication through assessing a fee on all water right holders. As of September 2001, out of a total of 219, 413 surface water claims in Montana, only 16,354 (7%) were in final decrees, and only 22,435 more (10%) were even in preliminary decrees. All the rest of the claims were either in temporary preliminary decrees, being examined, or not even yet examined. Department of Natural Resources and Conservation, *Water Rights in Montana* 5 (Dec. 2001).

able for new appropriation. The closure recognizes that senior water users would be subjected to the expensive burden of having to defend their claims for many decades by formally objecting to an endless stream of new water requests in basins with little or no water available for appropriation.[25]

The basin-closure laws allow some specific new water withdrawals, despite the closure. This article focuses on the Upper Missouri River basin closure. The Upper Missouri River basin closure allows new withdrawals for non-consumptive water uses; for domestic, municipal, and stock water uses; for applications to store water during high spring flows; and for ground water (as specifically defined by the basin closure statute).[26]

The Upper Missouri River Basin closure statute specifically defines *ground water* as "water that is beneath the land surface or beneath the bed of a stream, lake, reservoir or other body of surface water and that is not *immediately or directly connected to surface water.*"[27] In other words, the DNRC should not even process an application for ground water that is immediately or directly connected to ground water, let alone approve it.

Unfortunately, "immediately or directly connected" is not a hydrologic term. In its implementation of the basin closure statute, the DNRC assumed the task of interpreting what the legislature intended by the phrase, "not immediately or directly connected to surface water." The DNRC's interpretation has been the source of much recent controversy and was subject to a legal challenge that was recently decided by the Montana Supreme Court.[28]

### A. *The DNRC's Interpretation of "Immediately or Directly" Connected*

Through a series of departmental memos, the agency determined that ground water is "immediately or directly" connected to surface water only if ground water pumping pulls surface water into the aquifer, or "induces surface water infiltration."[29] According to this interpretation, if a well captures ground water that would otherwise discharge into a stream, then the ground water is not "immediately or directly" connected to surface water, and the permit application may be processed as a ground water exception to the basin closure.[30]

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25. *Ground Water in Montana, supra* n. 4, at 15.

26. Mont. Code Ann. § 85-2-343(2)(a-f).

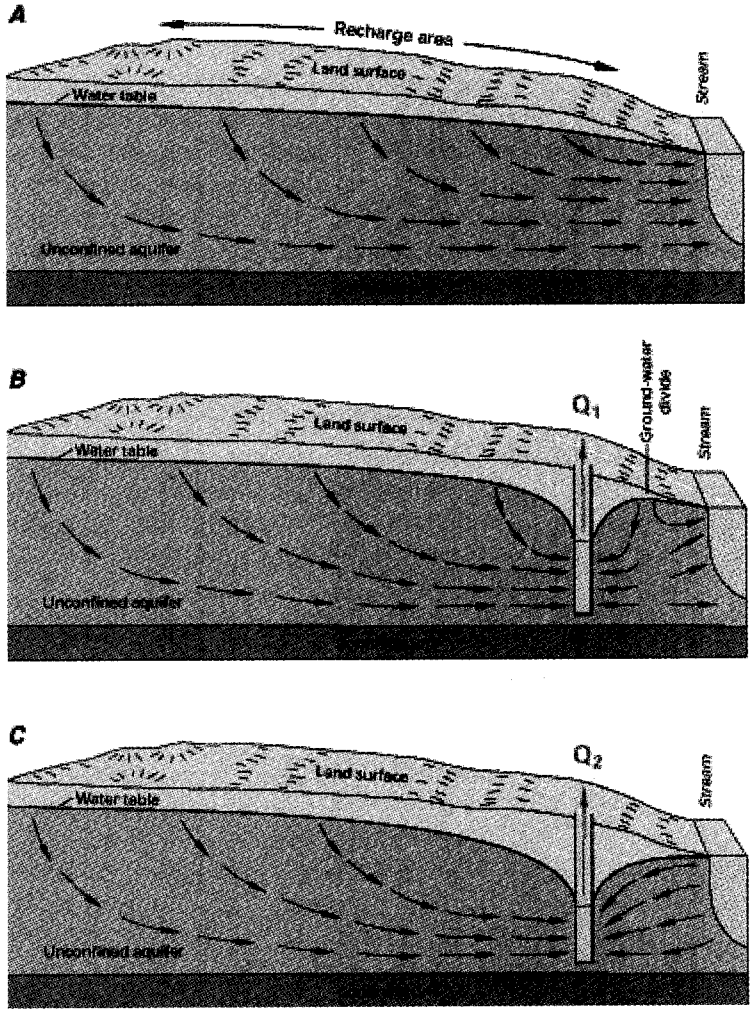
27. Mont. Code Ann. § 85-2-342(2) (emphasis added).

28. *Montana Trout Unlimited, et al. v. Mont. Dept. of Nat. Resources and Conservation,* 2006 Mont. 72. *See also Montana Trout Unlimited, supra*, n. 24, and *infra,* n. 51.

29. After Montana Trout Unlimited's case challenging the DNRC's interpretation had already been appealed to the Montana Supreme Court, the agency did finally codify their series of Departmental memos into a formal rule, defining the phrase, "directly or immediately connected to surface water" at ARM 36.12.101 (33), and setting out the requirements for determining induced surface water infiltration at ARM 36.12.120.

30. Once an application is publicly noticed other water users may object to the application based on an adverse impact on their water right, pursuant to Mont. Code Ann. § 85-2-311(1)(b) (2005).

The schematic cross sections below illustrate this concept. The top figure, A, depicts an aquifer that naturally discharges into a stream, shown in cross section on the right-hand side of the diagram.[31] The aquifer and the stream are hydraulically connected, as indicated by the continuity between the water table and the stream stage. The arrows indicate the direction of ground water flow. Because ground water discharges naturally into the stream, replenishing streamflow, the stream is termed "gaining."[32]




The center figure, B, shows what happens when a new well is installed and begins pumping water from the aquifer. Notice that the flow lines near

31. Figures A, B, and C from *Ground Water and Surface Water, supra* n.. 7.

32. *Groundwater and Surface Water, supra*, n. 7. Illustrates gaining, losing, and disconnected streams in cross sections and in map views.

the stream do not change direction. The stream remains a gaining stream, even though the well captures some of the ground water that otherwise would have discharged into the stream. Initially, the well pumps water out of aquifer storage, but over the long term, the amount of streamflow depletion is equal to the amount of water consumed by pumping.

The bottom figure, C, depicts what might happen if the well continues to pump for a bit longer, or if the well is located closer to the stream, or if the geological conditions are different. The cone-shaped depression -- aptly termed the "cone of depression" -- in the water table expands until it reaches the stream. At this point, the arrows show that the ground water flow direction near the stream has reversed. The formerly gaining stream has been converted into a losing stream in the vicinity of the ground water pumping. Instead of ground water *discharging* into the stream, surface water now *recharges* the aquifer. Thus, the pumping well has caused surface water to infiltrate through the streambed, and into the aquifer. Figure C illustrates what is meant by the term, "induced surface water infiltration" -- DNRC's criterion for "immediate or direct" connection.

According to the DNRC's interpretation, only the ground water in figure C is "immediately or directly" connected to surface water. Ground water in figure B is not, because pumping does not pull water directly out of the stream. The stream is still a gaining stream. An application to permit well B would be processed, even though the pumping would deplete streamflow just as surely as if it pulled water from the stream, like well C; the only difference would be in the timing -- not the quantity -- of streamflow depletion.

### B. *The Impact of the DNRC's Basin Closure Interpretation*

Montana's alluvial aquifers are generally quite permeable. Consequently, ground water pumping tends to create wide, shallow cones of depression. The water-table drop caused by pumping diminishes rapidly with distance from the well. Thus, unless a well is immediately adjacent to a gaining stream, it is unlikely to lower the water table enough to convert a gaining reach into a losing reach, thus inducing surface water infiltration into the aquifer. Therefore, the DNRC's requirements for demonstrating an "immediate or direct" connection effectively exempt all gaining streams from the protections offered by the basin closure statute. Likewise, losing streams are exempt if they are perched above the water table. This leaves only the rare stretch of stream that loses water, but is still connected to the underlying aquifer, eligible for basin-closure protection.[33]

This interpretation of "ground water" puts senior water users in a very difficult position. Because the DNRC will process nearly all new ground water applications under its limited definition of connectivity, senior users'

33. *Ground Water in Montana, supra* n. 4 at 16.

only remedy to protect their interests is to object formally to each new well application on the basis of its adverse affect on existing water rights. This is a daunting task because it is costly, time-consuming, complex, and contentious.

As a result, despite the acceptance of the connectivity between ground and surface water in the scientific community, the policy question of how to square hydrology with the DNRC's interpretation of "immediately or directly connected to surface water" has fallen to the courts.

## V. THE SMITH RIVER AND THE UPPER MISSOURI RIVER BASIN CLOSURE

In 1999, irrigators in the Smith River basin (part of the Upper Missouri River basin) were concerned enough about their water supply that they asked the Meagher County Conservation District to request the DNRC to conduct a hydrologic study of the river basin. Up to 60 irrigators in the upper Smith River basin willingly participated in the study.[34] Concerns were fueled largely by conversions from surface water-supplied flood irrigation to ground water-supplied sprinkler irrigation, as well as an overall increase in irrigated acreage made possible by the increasing reliance on ground water pumping.[35]

The DNRC began data collection in 2000, and the study was progressing well until a staff hydrologist wrote in an internal memo in March 2001, that, "it can be stated with certainty that ground water withdrawals have created impacts to surface flow of the Smith River."[36] Relations between the Meagher County Conservation District and the DNRC rapidly deteriorated. There were 15 new water use applications pending before the DNRC in the Smith River basin.[37] After an investment of two years and $91,000, the then-director of the DNRC, Bud Clinch, stopped the study[38] and instructed his staff to disregard its findings in regard to the pending applications.[39]

In addition to providing water for irrigation, the Smith River is a popular recreation river and blue-ribbon trout fishery. In 2001, portions of the river dried up, resulting in fish kills.[40] Irrigators, landowners, outfitters, and conservationists began to look beyond the drought for answers, and it quickly became apparent that despite the basin closure, there were a signifi-

34. Mike Roberts, DNRC hydrologist, personal communication to John Wilson (April 2001).

35. *Ground Water in Montana, supra* n. 4, at 17.

36. Memo from Bill Uthman, hydrogeologist, to Andy Brummond, Water Resources Specialist, *Cumulative Impacts to Smith River Surface Flow from Groundwater Wells* (Mar. 8, 2001) (copy on file with Montana Department of Natural Resources and Conservation).

37. *Ground Water in Montana, supra* n. 4 at 17.

38. *Id.*

39. Ltr. from Bud Clinch to Donna Burns, Administrator, Meagher County Conservation Dist. (Apr. 18, 2002) (copy on file with Department of Natural Resources and Conservation).

40. Mr. Steve Leathe, Region 4 Fisheries Manager, Montana Department of Fish, Wildlife, and Parks, personal communication to Laura Ziemer (March 9, 2006).

cant number of new applications for ground water pumping and many new ground water permits had already been granted.[41] Montana Trout Unlimited pressed DNRC to complete an Environmental Assessment of the cumulative impacts of granting the pending 15 applications. The conclusions of the EA were eye-opening.

The EA stated that, "[t]he Smith River and its principal tributaries are interpreted to be gaining streams that are hydraulically connected to ground water."[42] Further, the EA concluded that if the new wells are permitted, they will reduce surface flows by an estimated 37 percent of the pumped volume in the first year, with the reduction in surface flows continuing to escalate over time. After ten years of pumping, stream flows would be reduced by 80 percent of the volume pumped and after eighty years, flows would be reduced by 100 percent of the volume pumped.[43]

Yet, like the ground water pumped by wells upstream from the McGuire Ranch, the DNRC does not consider the ground water pumped by the proposed new wells to be "immediately or directly" connected to Smith River surface water.[44] This is because the streamflow reduction occurs by interception of the ground water tributary to, and discharging to, surface water *(the situation illustrated in fig. B, above)* rather than by inducing surface water infiltration *(fig. C, above)*. The science was clear: the ground water to be pumped by these pending wells was hydraulically connected to the surface water, and pumping would result in quantifiable stream depletions in a river that was already over appropriated.[45] Yet for purposes of the basin closure, this very same ground water was considered by the DNRC not to be immediately or directly connected to surface water.

In July, 2003, nine irrigators and landowners along the Smith River, three outfitters, and Montana Trout Unlimited filed an action in district court challenging the DNRC's implementation of the Upper Missouri River Basin Closure's statutory directive.[46] The plaintiffs in the lawsuit alleged that by continuing to *process* ground water applications that the agency has determined will *deplete* Smith River flows, the DNRC was abusing its discretion under the basin closure law. Trout Unlimited and the irrigators ar-

41. *Ground Water in Montana, supra* n. 4, at 17.

42. *Id.* at 38.

43. *Id.*

44. The only exception to this was one well considered in the EA that was subject to objections, and therefore a lengthy and expert-intensive hearing, known as the "Springdale" case. There, objectors proved in fact that the DNRC was mistaken and that in fact the ground water sought for withdrawal was directly or immediately connected to surface water. DNRC Proposal for Decision, Springdale Proposed Ground-water well, March 10, 2004, at 14 (lines 23-25) (on file with Dr. Eloise Kendy).

45. *See generally* Montana Department of Natural Resources and Conservation, *Smith River Basin Permit and Change Applications Supplemental Environmental Assessment*, Chapter 3; http://dnrc.mt.gov/wrd/water_mgmt/groundwaterstudies/smith_valley/smithvalley-ea-2005final.pdf (May 16, 2003).

46. *Montana Trout Unlimited, et al. v. Mont. Dept. of Nat. Resources and Conservation*, 2004 Mont. Dist. LEXIS 1949 (Feb. 10, 2004).

gued that the DNRC's interpretation of the basin closure law, which allowed new ground water pumping to injure senior water rights, did not comport with the agency's statutory directive.[47] In 2004, the district court ruled that the implementation of the basin closure was committed to agency discretion.[48] As this article was going to press, the Supreme Court issued its decision, reversing the lower court.[49] In a 5-2 opinion, the Court determined that the DNRC was abusing its discretion, ruling in favor of Trout Unlimited, the ranchers, and outfitters who brought the case. The Supreme Court held:

> The Basin Closure Law serves to protect senior water right holders and surface flows along the Smith River basin. It makes no difference to senior appropriators whether groundwater pumping reduces surface flow because of induced infiltration or from prestream capture of tributary groundwater. The end result is the same: less surface flow in direct contravention of the legislature's intent.[50]

The Montana Supreme Court's strong opinion left no doubt that the purpose of the Upper Missouri Basin Closure law was to protect surface flows and senior water users like rancher John McGuire (one of the plaintiffs in the case).[51] The Court's ruling that the DNRC can not ignore the impacts of ground water pumping on river flows and senior irrigation rights has important implications for the Agency's management of ground water in Montana.

## VI. THE GALLATIN RIVER: BREAKING NEW GROUND ON GROUND WATER

Meanwhile, on the Gallatin River, the expanding extraction of ground water for residential and commercial growth continued to take its toll. Events came to a head in July, 2003, when contested-case hearings were held on a developer's application for a new ground water pumping permit to provide water to a proposed golf course and residential development along the Gallatin River, on land known as the "Day Ranch."[52]

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47. *Montana Trout Unlimited, et al. v. Mont. Dept. of Nat. Resources and Conservation,* 2004 Mont. Dist. LEXIS 1949. Petitioner's brief may be found at: http://www.lawlibrary.state.mt.us/dscgi/ds.py/Get/File-41760/05069a.PDF. The briefs are sorted by the month that they are filed with the Court. Appellants' Opening Brief was filed May 26, 2005, Respondents' Briefs were filed on July 25, 2005, and Appellants' Reply Brief was filed on August 8, 2005.

48. *Montana Trout Unlimited, et al. v. Mont. Dept. of Nat. Resources and Conservation,* 2004 Mont. Dist. LEXIS 1950 at 8 (October 8, 2004).

49. *Mont. Trout Unlimited et al. v. Mont. Dept. of Nat. Resources and Conserv.*, 2006 MT 72 (Apr. 11, 2006).

50. *Id.* at ¶ 43.

51. *Id.* at ¶ 30.

52. *In the Matter of the Application for Beneficial Water Use Permit Number 41H-30003523 and Application for Change Number 41H-300008-6 by Mont. Golf Enterprises, LLC. See* Proposal for Deci-

The Day Ranch developer planned to drill four wells adjacent to Fish Creek, a tributary to the Gallatin. The wells would pump a combined total of 920 gallons per minute.[53] Irrigators; conservationists (Trout Unlimited and the Greater Yellowstone Coalition); the Montana Department of Fish, Wildlife, and Parks (FWP); and Pennsylvania Power and Light (owner of several hydroelectric dams on the Missouri River) opposed the developer's efforts to obtain a water permit from the DNRC. After two days of hearings and extensive legal briefing, the hearings examiner recommended denial of the permit application.[54] Although the developer initially appealed, in the spring of 2004 he withdrew the appeal and abandoned the development proposal.

The Day Ranch case was the "canary-in-the-coal-mine" for Gallatin County. The depletion of Gallatin River flows due to rapid ground water development along the river corridor was now firmly in the public consciousness. Irrigators, conservationists, and the Gallatin County Commission began to grapple with how to address this threat from which the basin closure statute, as currently interpreted by the DNRC, provides little protection.

A flurry of events unfolded in the wake of the failure of the Day Ranch permit application. The Gallatin County Commission convened a Task Force to study water rights and flood-plain issues in the county.[55] Gallatin County irrigators came together and formed "AGAI," the Association of Gallatin Agricultural Irrigators, in part to address the threat of additional ground water pumping proposals on senior water rights. A new citizens group, The Four Corners Community Foundation (FCCF), was created. Named after a location along the Gallatin River that is under intense development pressure, the FCCF petitioned the DNRC for the designation of a "temporary controlled ground water area" along the River.[56] A number of development interests opposed the petition, and the DNRC denied the petition in November of 2005.[57]

Citizens also formed a Gallatin River watershed group -- the Greater Gallatin Watershed Council (GGWC) -- and through an open and democratic, county-wide public-input process, determined that addressing the ground water-surface water connection should be one of its primary mis-

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sion at http://dnrc.mt.gov/wrd/water_rts/hearing_info/recent_hearingdecisions/montanagolf_pfd.pdf (Nov. 19, 2003).

53. *Id.* at 31.

54. *Id.* at 46.

55. Alan English, Manager, Gallatin Local Water Quality District, located at 311 West Main, Room 311, Gallatin County Courthouse, Bozeman, Montana, 59715, facilitated the Task Force.

56. Mont. Code Ann. § 85-2-506.

57. Proposal for Decision in the matter of Petition for Establishment of the Four Corners Controlled Ground Water Area No. 30011241, Oct. 17, 2005, Hearing Examiner Scott Irvin, Dept. of Nat. Resources and Conserv. (copy on file with Authors).

sions.[58] The GGWC then tapped significant volunteer hours to submit an ambitious grant to the Environmental Protection Agency for a ground water study of the area.

After the Gallatin County Commission's Task Force completed its work, in winter of 2005, the Gallatin County Commission revised its subdivision regulations to require developers to obtain water-right permits from DNRC *before* filing preliminary plat applications.[59] This has the effect of making developers demonstrate that they have their water rights in hand before they sink significant funds into further developing a subdivision. This provides the DNRC with greater room to make an objective decision, as prior regulations put DNRC staff in a very difficult position to have a multi-million dollar development already underway and *then* deny or condition that development's water rights.

Despite all these actions, ground water pumping applications continue to be filed with the DNRC. As of March 29, 2006, DNRC had granted 432 new permits to pump more than 56,000 gallons per minute and irrigate more than 6,500 new acres of cropland within the upper Missouri River basin since the closure of the basin to new surface water appropriations.[60]

In 2005, DNRC granted a municipality exemption to new ground water applications in Four Corners (a rapidly-growing area west of Bozeman), allowing the applications to proceed despite the basin closure. Faced with new ground water pumping applications for hundreds of homes and new commercial uses along the Gallatin River, irrigators, anglers, and citizens in the area mobilized to address their common concern about the impact of the proposed ground water development on Gallatin River flows. Montana Trout Unlimited, AGAI, the FWP, the West Gallatin Canal Company, and several individual citizens filed objections to the new applications.[61]

Knowing that the contested case proceedings were going to require expert hydrologic analyses, the irrigators, anglers, concerned citizens, and FWP hired well-known and respected hydrologist Dr. John D. Bredehoeft (formerly with the United States Geological Survey) to analyze the impacts on Gallatin River flows from the proposed ground water pumping.

The development in this case involved eight new wells and three recently conditionally-permitted wells (Galactic Park) to provide water to a central-

58. Greater Gallatin Watershed Council annual meeting, comments of Jeff Larmer, Executive Director (July 2005). Both Laura Ziemer and Eloise Kendy were in attendance.

59. Gallatin County Subdivision Regulations (MT) § 5(D)(12) (2005), http://www.gallatin.mt.gov/planning/index.htm, *select* Subdivision, *select* Subdivision Regulations (last accessed May 1, 2006).

60. Personal communication from David J. Coey, Information Systems Support Specialist, DNRC, to Eloise Kendy, March 26, 2006 (copy of email on file with Public Land and Resources Law Review office).

61. *Application No. 41H-30012025, application for municipal use groundwater well, 800 gpm, 455.29 acre-feet, No. 41H-30013629, application for municipal use groundwater well, 100 gpm, 29.45 acre-feet, and No. 41H-30014080, application to change a water right for augmentation purposes, by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont.*

ized water and sewer system, which would then service the new residential and commercial development in the Four Corners area. In this instance, the wastewater treatment center is located *upstream* of the ground water wells, and will discharge the treated water into the aquifer, through which it will flow back to the Gallatin River. For the residential and commercial uses proposed, *consumptive* water use is approximately five percent of the total ground water pumped and delivered for indoor use.[62] Most of the consumptive water use will be for lawns, gardens, and other landscaping. In all, the objectors' and applicants' experts estimated that 194.4 acre-feet of water would be consumed annually; approximately 84 percent of that consumption will be for outdoor use during the growing season.[63] Exempt irrigation wells discussed below will consume additional water.

The entity applying for the new ground water pumping permits, Utility Solutions, LLC, did not contest that the pumping would deplete Gallatin River flows.[64] The question then became how to mitigate, or offset, the depletion due to the new ground water development. Dr. Bredehoeft modeled the proposed pumping and found that even though irrigation would only occur during the summer, streamflow depletion would occur year round, due to the dampening effect of the aquifer.[65] He also modeled what would happen if water were artificially recharged into the aquifer via "infiltration galleries," or subsurface depressions with permeable bottoms that allow water to slowly flow into the aquifer.[66] Dr. Bredehoeft determined that if a volume of water equal to the amount of water consumed is put into the infiltration gallery, then the amount of water discharging from the aquifer into the river would balance out the water being captured by new ground water pumping.[67] The infiltration galleries presented a way to offset winter streamflow depletions even though artificial recharge, like pumping, would occur only during the summer. Dr. Bredehoeft's analysis showed that even if water were diverted into the infiltration gallery only during part of the

62. *In the Matter of Application for Beneficial Water Use Permit No. 41H-30012025, by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont.*, Direct Test. of Dick Stenzel, Colorado State Engineer, at 5-7 (filed Nov. 18, 2005).

63. *In the Matter of Applications Nos. 41H-30012025 and 41H-30013629, by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont.*, Direct Test. of Eloise Kendy, at 4-7 (filed Nov. 18, 2005). 124.4 acre-ft per year for Gallatin Hideaway, Northstar, and Bozeman Hotspring subdivisions, including 109 af/y for irrigation, and 70 af/y for Galactic Park subdivision, including 54.3 af/y for irrigation.

64. *See e.g. In the Matter of Applications Nos. 41H-30012025, 41H-30013629, and 41H-30014080, by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont.*, Memo. of Points and Authorities in Support of Augmentation (filed Mar. 2, 2006) (on file with authors).

65. *See In the Matter of Applications Nos. 41H-30012025 and 41H-30013629 by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont.*, Direct Test. of John D. Bredehoeft, at 5-6 (filed Nov. 18, 2005).

66. *Id.*

67. *Id.*

irrigation season, it would ultimately mitigate year-round depletions so long as the correct volume of water was put into the infiltration gallery.

Montana Trout Unlimited, AGAI, FWP, and the other objectors were all concerned about what the source of the water would be to offset the river depletions due to new ground water pumping. A sometimes heated debate among all parties ensued regarding whether spring peak flows could be used to offset the new depletions. Also debated was whether the entire amount of historically-diverted water from senior irrigation rights was available to offset the new depletions. This would have the effect of putting former irrigation return flows to a new beneficial use of augmentation, to offset new consumptive use. The parties also extensively discussed whether water to offset the new depletions had to come only from water that had been historically consumed through irrigated crops.

Ultimately, Montana Trout Unlimited, AGAI, FWP and Utility Solutions, LLC, and their respective experts worked together to settle only days before the contested case hearing was to begin.[68] The settlement involved changing the use of senior surface water rights for 200 acres from irrigation to augmentation. The 200 acres are no longer being used to grow crops because they are being developed into subdivisions and new commercial areas.[69] Only that portion of the irrigation right that had been historically consumed (evapotranspired) by the crop was determined through the settlement to be available for augmentation purposes.[70] FWP's expert, Andy Brummond, and Utility Solutions' experts closely analyzed historic irrigation practices to determine the amount of water that crops historically consumed at the site. Of the historically consumed water right, 70 cfs will be left – and protected – instream to compensate for the pumping of three wells located close enough to the river that depletions will occur primarily during the irrigation season.[71] The remaining 124 cfs will be conveyed to infiltration galleries located the same distance from the river as the remaining eight wells to compensate for year-round depletions that they will cause.[72] Like the original senior water rights that are being changed, the augmentation water right may only be used during irrigation season.

The eleventh-hour settlement achieved in the Utility Solutions matter sets an important precedent for several reasons. First, an infiltration gallery is being used to offset year-round river depletions due to ground water pump-

68. Some of the concerned citizens decided to argue another aspect of the case, not subject to the settlement. They are arguing the legal issue of whether the Upper Missouri Basin Closure's exemption for "municipal" use applies to new residential and commercial development or only to existing cities and towns.

69. *In the Matter of Applications Nos. 41H-30012025, 41H-30013629, and 41H-30014080, by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont., See* Consent to Entry of Administrative Orders (filed Dec. 19, 2005).

70. *Id.*

71. *Id.*

72. *Id.*

ing. Second, Dr. Bredehoeft's hydrologic modeling demonstrated that to mitigate streamflow depletion from wells that are located far from a stream, it is the *amount* of water that is diverted into the infiltration gallery that is critical, rather then when it is diverted, or for how long. Dr. Bredehoeft's analysis also underscored that the amount of water needed to offset river depletions must be equal to the estimated new consumptive use.[73] Third, the Utility Solutions settlement sets the standard that only historically consumed – not simply diverted – irrigation water could be used for augmentation purposes.

These three elements set a high standard for augmentation: the *timing* of the depletion is addressed, the *location* of the specific river reach being depleted is receiving the augmentation water, and the Gallatin River is receiving the same *amount* of augmentation water that is being withdrawn through ground water pumping.

There is only one element in the Utility Solutions settlement with which the concerned anglers, irrigators and FWP were not satisfied. Utility Solutions, LLC, chose to rely on "exempt" ground water wells for a portion of its commercial and domestic landscaping uses.[74] This exemption is intended to allow the single, rural resident to obtain a well for domestic needs without going through the DNRC's permitting process.[75] Even though Utility Solutions was putting in a central water system, the developers chose to use *exempt* wells for a portion of the development's commercial and residential landscaping uses. Although the objectors asked Utility Solutions to augment for the exempt wells' impact on river flows, Utility Solutions chose not to do so because such mitigation is not legally required.[76] Because these wells are exempt from DNRC permitting requirements – and therefore not part of the contested case proceedings – there was no way for the concerned anglers, irrigators, and FWP to require mitigation of these wells' impacts.

The Utility Solutions augmentation plan shows one way to allow new ground water development without depleting river flows: through thoughtful, well-planned augmentation, which essentially requires trading one water right use for another. However, closing the "exempt-well" loop-hole will be important for this approach to work, and standards for augmentation

73. *See supra*, n. 65, at 6. This is an important point, which the DNRC administrative rules (effective January 1, 2005) overlook. According to the DNRC, only depletions that occur during the period of withdrawal during the first year must be mitigated. However, due to the dampening affect of the aquifer, annual depletion will increase for as much as 15 years before stabilizing, and maximum depletion will occur in January, outside the period of withdrawal for irrigation. The maximum streamflow depletion rate is equal to the total ground water consumption rate.

74. *Application No. 41H-30012025, application for municipal use groundwater well, 800 gpm, 455.29 acre-feet, No. 41H-30013629, application for municipal use groundwater well, 100 gpm, 29.45 acre-feet, by Utility Solutions, LLC, before the Dept. of Nat. Resources and Conserv. of the State of Mont.*

75. Mont. Code Ann. § 85-2-306(1) ("exempt" well provision).

76. *Id.*

need to be set. Finally, the basin closure laws need to be amended so that the kind of augmentation achieved in the Utility Solutions matter does not depend on objectors engaging in expensive legal proceedings in order to obtain the result. Ideally, basins in which water has been fully allocated will be totally closed to new allocations. Instead of new allocations, the source of water for new water rights will come from existing water rights with new beneficial uses.

## VII. UPSETTING THE DOCTRINE OF PRIOR APPROPRIATION: POLICY CONSIDERATIONS

The DNRC's limited interpretation of "immediately or directly" has far reaching policy and water law implications. It does not effectively limit new ground water pumping applications nor require augmentation to mitigate for adverse impacts to river flows. This means that the following example is likely to continue to play out: a developer or rancher applies for a new permit to appropriate ground water in the fully-appropriated Upper Missouri Basin. The well is situated away from the river but captures ground water that is tributary to the river and therefore contributes to surface flows. The ground water this well would pump and consume would not be considered directly connected to the river under the DNRC's limited definition that the well must "induce surface water infiltration." Yet, the well will have an adverse effect upon permitted surface water users. Under Montana law the senior surface users have two options once the application is processed. They can formally object based on adverse effect or they can do nothing. If they object, it is likely that they will prevail on the basis of adverse effect, but at considerable time and expense. To fully protect their interests they must object to every well application in their basin for decades.

Alternatively, if senior surface users do nothing and they find they are not receiving the water they are entitled to, they can place a "call" on a junior surface water right holder.[77] Surface water users, not the much more junior (by over 100 years) ground water users, get targeted with "calls" for two reasons. First, it is much easier to associate a streamflow diversion than a ground water pump with low flows downstream.[78] Second, because ground water pumping causes delayed hydraulic responses, it can take weeks to months for streamflow to recover after a well is shut down.[79] The

77. A "call" is a basic tenant of western water law, whereby a junior water right holder must forego his water use if an upstream senior water user's right is not fulfilled. *See e.g.* Dan Tarlock, James Corbridge & David Getches, *Water Resource Management: A Casebook in Law and Public Policy* 339-340 (4th ed., Foundation Press 1993).

78. Streamflow diversions immediately decrease streamflow, whereas impacts of ground water pumping on streamflow are dampened and delayed, and the location of the impact (stream reach) is controlled by sometimes poorly understood geologic structure.

79. *See* Roger B. Wallace, Yakup Darama, & Michael D. Annable, *Stream Depletion by Cyclic Pumping of Wells*, 26 Water Resources Research 1263-1270 (1990). *See also* Sushil K. Singh, *Flow*

complexity of attempting to "call" junior ground water users is illustrated in neighboring Idaho, where on April 19, 2005 the Idaho Department of Water Resources issued an order limiting ground water pumping from the Eastern Snake Plain Aquifer in response to a "call" from irrigators holding senior surface water rights.[80]

Water rights administration on the Gallatin River graphically illustrates this problem. In the summer of 2004, in response to low streamflow in the Gallatin River, only water rights with priority dates older than 1882 received their water for the full irrigation season. Mid-way through the irrigation season, the water commissioner shut off "1883 water" completely, and shut off about half of "1882 water." Eventually, as "calls" ripple down through the user priority dates, a point will be reached where a call doesn't work because the junior user has no water to give. At that point the surface water user--for example, one with an 1881 priority date--would be unable to get water through a call on junior surface users.

Yet that same surface water user may look across his field and see a 2005 permitted ground water well pumping and driving a sprinkler. In most cases, it would be futile for the 1881 priority date surface water user to place a call on the well to get his water. Even if the call were successfully executed, depending upon the properties of the aquifer and rate/duration of pumping, it could take months for the streamflow to recover. For an irrigator, this delay is impractical. October delivery of irrigation water is meaningless. Thus, under DNRC's current administration of the basin closure law, the reality is that a 2005 ground water permit that intercepts ground water that is tributary to and discharges to surface water will continue to receive its water at the expense of an 1881 priority date surface water permit. In other words, "first in time, first in right" no longer works in this instance.

Motivated by these kinds of concerns, irrigators from the Gallatin Valley, through AGAI, led an effort in Montana's 2005 legislative session to amend the Upper Missouri Basin Closure law so that it would explicitly prevent new ground water pumping that would deplete surface flows.[81] That effort gained the support of DNRC. This legislative effort (Senate Bill 269) focused legislators' attention on the problem posed by new ground water development, but there was not consensus on how best to address it. With mounting support from diverse groups of water users, the bill passed the Senate, but died in committee on a tie vote in the House.

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*Depletion of Semipervious Streams Due to Pumping*, 129 Journal of Irrigation and Drainage Engineering 449-453 (2003).

80. *See* David C. Moon, *Idaho Conjunctive Use Battle: Order Issued in Response to Priorty "Call,"* 15 The Water Report 15-17 (May 15, 2005) (noting "Approximately 1300 groundwater users are subject to curtailment [of their water use] under the order").

81. Mont. Sen. 269, 59th Leg., Reg. Sess. (2005).

Eyes are now on the crucible of ground water development in the Gallatin Valley. Events are unfolding at a rapid pace, and irrigators, Trout Unlimited, and concerned citizens in Four Corners have combined resources to bring sophisticated scientific and legal scrutiny to bear on new ground water pumping applications. The intensity of this debate is forging new approaches for ground water development. The DNRC has shown leadership in this area through the formation of two working groups to address ground water reform during the fall of 2005, and continuing through the winter of 2006. These working groups include the Gallatin Valley parties, Trout Unlimited, and others from around the state. The dialogue happening within the working groups has moved forward ground water reform, and will inform the 2007 Montana legislative session.

## VIII. RECOMMENDATIONS FOR REFORM

The current system of ground water management in Montana is not working for anyone because of the uncertainty surrounding what is required for a new permit, uncertainty surrounding what the DNRC will consider adequate mitigation, and the time and expense of the permit proceedings for applicants, objectors, and the DNRC. The authors' experience in the events chronicled in this article has informed our recommendations for reform. The reforms suggested below would provide a more stream-lined and predictable application procedure that would benefit new ground water applicants, and they would create a flexible application procedure that the DNRC could implement without significantly taxing staff resources. In addition, these reforms should prevent foreseeable adverse impacts to river flows and senior water right holders, and thereby provide relief from the expensive cycle of objections and contested case proceedings.

As a starting point, Montana's various basin closures should have a unified treatment of ground water, to bring predictability to ground water permitting procedures in closed basins. This could be done by creating a new section in the water code that defines ground water in closed basins, and sets out the conditions under which permits could be issued. Ground water should be defined in the statutes the same as it is defined scientifically, simply as water beneath the land surface,[82] and the statutes should recognize the inherent connection between ground water and surface water.

Second, all of Montana's basins that are closed to new surface water appropriations should also be closed to new ground water appropriations. In order to ensure that closed basins do not become further over-appropriated, the authors recommend allowing at most only two exceptions to this closure

82. For a more precise definition from the hydrogeologic literature, see R. Allan Freeze & John A. Cherry, *Groundwater* 2 (Prentice-Hall, Inc. 1979) ("subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.").

to ground water. One exception would be for single-dwelling domestic use or stock-water tanks (this recommendation will be treated in more detail below). The other exception would be for a ground water pumping application that includes an augmentation plan to mitigate adverse affects, including streamflow depletion.

This approach means that in closed basins, the source of water for new water rights will come from existing water rights, but with new beneficial uses. This approach recognizes that in a river basin that is already over-appropriated, it does not make sense to engage in the fiction that there is still "new" water available for appropriation.

A. *Augmentation Plans— Primary Exception to Ground Water Closure*

The authors foresee that the primary exception to the recommended moratorium on ground water pumping in closed basins would be through providing augmentation water. In order to ensure that river flows and senior water rights are not harmed by new ground water pumping in closed basins, augmentation plans must accompany a proposed permit and be carefully crafted. The authors recommend that new legislation require augmentation plans to meet the following standards:

- Augmentation plans must offset the *quantity* of consumptive use due to new ground water pumping with an equal volume of historically-consumed water from an existing water right (typically an irrigation right);
- Augmentation plans must return water to a stream at the same *location* (stream reach) and at the same *time* as the surface depletion due to new ground water pumping would occur; and,
- Existing water rights that are used to augment new water rights must have high enough seniority in the priority system to ensure their annual availability. In other words, a very junior irrigation right cannot provide adequate augmentation water for year-round consumptive use by a new, major subdivision.

These three straightforward standards for augmentation plans mean that there would be little additional flow depletions in closed basins. They would protect senior surface water rights by requiring bucket-for-bucket compensation between new ground water developed and augmentation, through senior surface rights dedicated to this purpose. Finally, through the use of artificial recharge, such as the infiltration galleries that Utility Solutions will employ, a seasonal irrigation right can provide adequate augmentation for a new year-round use. In addition, artificial recharge ensures that so long as an existing surface right is senior enough to be consistently in priority for high spring flows, the augmentation is highly likely to succeed.

Providing an exception to a ground water pumping closure through augmentation plans that meet these three standards is highly advantageous to new applicants. Such an exemption allows them to obtain water rights in closed basins without adversely affecting senior users. In essence, it pro-

vides a means for out-of-priority users to obtain water rights without the risk of senior right holders placing "calls" on their junior use. By ensuring that junior appropriators, whether of surface water or of tributary ground water, augment streamflow to avoid injury to senior users, augmentation provides a flexible tool for enabling new uses of water without injuring existing rights.[83]

In some cases, augmentation may simply mean changing the use of an existing water right from irrigation to instream flow. In other cases, streamflow depletion may be mitigated by artificially recharging water from an existing water right into the aquifer. Utility Solutions' application used such an approach by diverting Gallatin River water into a historically-used irrigation ditch, and conveying the water through a ditch lateral into an infiltration gallery.

While the determination of the appropriate augmentation will still require hydrologic analyses and, in some cases, engineering analyses, this approach moves the emphasis of such analyses from nonsensical debate over whether streamflow depletion will occur, to constructive design of appropriate mitigation. Limiting new ground water permits to those that include such augmentation plans would bring a transparency and predictability to ground water permitting that is currently lacking in Montana's ground water administration.

### B. *Single Domestic and Stock Tank Use—Exempt from Ground Water Closure*

The second exemption to closure to new ground water uses would be for a single, domestic use and stock tank use. This means that the practice of "exempt well" permits would remain even in basins closed to ground water, but they would be small wells in rural areas. The authors recommend some straightforward limitations on the use of "exempt" wells to ensure that multiple "exempt" wells do not replace a central well providing water to multiple residences in rapidly-developing areas.

First, new legislation treating ground water in closed basins should make explicit that "exempt" wells cannot be used in a subdivision or commercial development. Only the first time that a large parcel is divided into a "minor" subdivision (5 lots or less) may multiple lots rely on exempt wells. [84] Second, there should only be one exempt well per property. Third, the volume allowed for exempt wells should be decreased from 10 acre-feet per

83. William Blomquist, Edella Schlager & Tanya Heikkila, *Common Waters, Diverging Streams: Linking Institutions and Water Management in Arizona, California, and Colorado* 101 (Resources for the Future Press 2004); Lawrence MacDonnell, Colorado's Law of Underground Water: A Look at the South Platte Basin and Beyond, 59 U. Colo. L. Rev. 579, 589 (1988).

84. This requirement would mean that both "major" and "minor" subdivisions must have a central well that goes through DNRC permit review, except for the first minor subdivision of a larger parcel. *See* Mont. Code Ann. § 76-3-609(2) (defining first minor subdivision).

year to two acre-feet per year and the flow rate decreased from 35 gpm to 25 gpm. Since one acre-foot typically supplies a family of four's water needs for one year, this reduction should not compromise rural residents' reliance on exempt wells. Fourth, lawn and garden irrigation should be limited to one-fourth of an acre, as a maximum. Finally, stock tanks can be filled with an exempt well.

These simple limitations on the use of exempt wells are designed to meet the needs of rural residents. These recommendations also mean that in rapidly-developing areas, new ground water development must go through DNRC permitting and be accompanied by an augmentation plan.

## IX. CONCLUSION

This is a tenuous time for senior water users in Montana. Without a concerted effort on their part, rapidly increasing numbers of new ground water wells will continue to deplete rivers and streams.

Until the statewide water right adjudication is completed, the amount of surface water available for new appropriation, if any, is unquantified. It is generally accepted that most basins in western Montana are either fully or over appropriated. In addition to the Smith and Gallatin Rivers, the Big Hole, the Beaverhead, the Jefferson, and the Upper Clark Fork Rivers, just to name a few, have all experienced acute water shortages. Along with the Smith River, irrigators along the upper Beaverhead River are resorting to supplementing their surface water irrigation through ground water pumping at an unprecedented rate.

By statute, the Upper Missouri River basin closure allows Montana's DNRC to process and grant new ground water applications only if the ground water is "not immediately or directly connected to surface water."[85] Contrary to basic hydrologic principles and the clear language of the statute, the agency has elected not to include ground water that is tributary to surface water within the definition of "immediately or directly connected to surface water," even while DNRC's own experts acknowledge that capture and consumption of these tributary ground waters reduce stream flows:

> For a hydrologic evaluation to conclude that an 'immediate and direct' connection has not occurred simply means that the groundwater pumped by the well is not immediately and physically obtained from a surface water source. For the evaluation to conclude that no depletion of streamflow will occur is simply erroneous . . . .[86]

This article's recommendations for legislative reform of closed basins' treatment of ground water would respect the scientific principle that ground

85. Mont. Code Ann. § 85-2-342(2).
86. Uthman, *supra* n. 9, at 14.

and surface water are connected. The recommended reforms attempt to prevent further water depletions in river basins already determined to be over-appropriated. If implemented, the suggested legislative changes would be an important step toward incorporating sound scientific principles into Montana's water management.

As a headwater state, Montana is in the fortunate position of controlling nearly all of its own water. As a sparsely populated state, Montana is in the enviable position of having comparatively few user conflicts. As a northern state, Montana has more streamflow than its thirsty neighbors to the south. As a late-bloomer in terms of economic development, Montana's water managers can benefit from the mistakes and successes of other western states. The Montana Supreme Court's decision rejecting the DNRC's interpretation of the Upper Missouri River basin closure is likely to be a catalyst for movement toward a rational ground water policy in Montana that protects the senior water rights of irrigators and river flows while accommodating new population growth and agricultural demand for ground water. The first step towards such a rational ground water policy is the recognition that ground and surface water are part of one limited resource, upon which we all depend.